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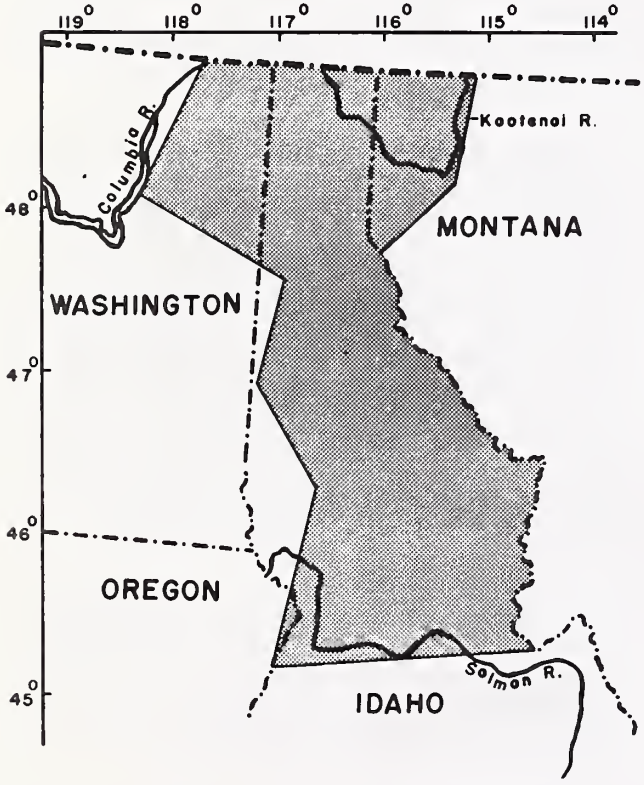
January 1981

SEED TRANSFER GUIDELINES FOR DOUGLAS-FIR IN NORTH IDAHO

G. E. Rehfeldt[1]



[1]Plant Geneticist, located at Intermountain Station's Forestry Sciences Laboratory, Moscow, Idaho.

USDA Forest Service Research Note INT-300

Douglas-fir seeds for reforestation in Northern Idaho (see map) may be transferred from the collection area:

(1) ± 325 feet (100 m) elevation;

(2) ± 0.5 degrees latitude (about 30 miles [48 km]);

(3) without regard to habitat type;

(4) without regard to longitude.

Thus, seed zones should encompass about 650 feet (200 m) elevation and 1 degree of latitude.

Whenever trees are planted, there is some risk of maladaptation. Even with adherence to the guidelines presented above, a planted tree may not be adapted to the environment in which it is planted. The risk of maladaptation can be assessed by growing trees from various seed sources in environments that represent anticipated transfer distances. Then, the risk can be expressed as a percentage that populations differ genetically across environmental gradients.

Figures 1 and 2 show the differences expected between seedlings derived from natural reproduction and planted trees that have been transferred various distances from their origin. For instance, as compared with a local seed source, trees transferred 1 000 m (3,050 ft) upward in elevation are expected to possess 26 percent greater growth potential and 15 percent less spring bud set; but they are expected to suffer 31 percent more fall frost injury and 19 percent more spring frost injury and be 31 percent less winter hardy (fig. 1). Even transfers between single seed zones are expected to differ from indigenous sources by about 5 percent in growth potential, 3 percent in spring bud set, 6 percent in fall frost injury, 4 percent in spring frost injury, and 6 percent in winter cold hardiness.

Similarly, transfers of seed to locations north or south of their origin are associated with a risk of maladaptation. Transfers across a single seed zone of 1 degree latitude should differ from indigenous sources by 3 percent in growth potential, 4 percent in spring bud set, 2 percent in spring frost injury, and 6 percent in winter cold hardiness (fig. 2).

These seed transfer guidelines reflect current data. Future research may either refine these limits or uncover additional geographic and ecologic factors that should be used to control seed transfer. Nevertheless, because patterns of genetic differentiation among populations of Douglas-fir are so strongly defined, current guidelines should be put into practice.

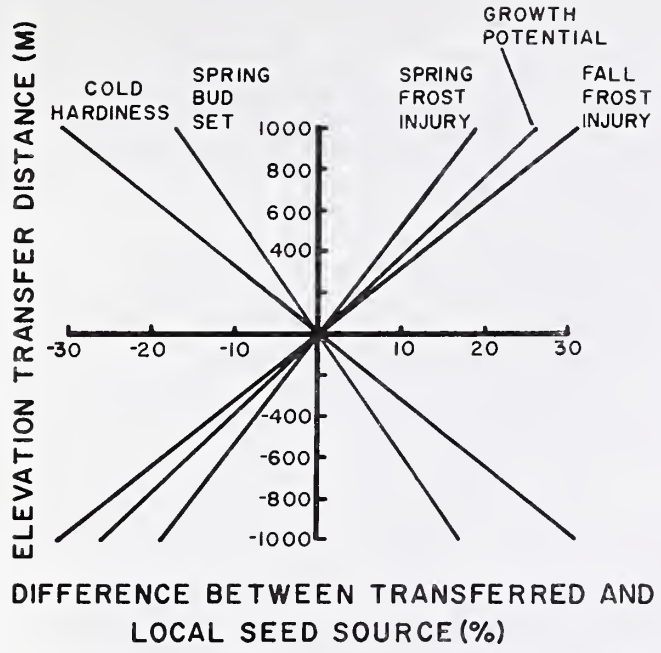


Figure 1.—Percentage differences expected between indigenous seed sources and sources transferred various distances in elevation for several characters.

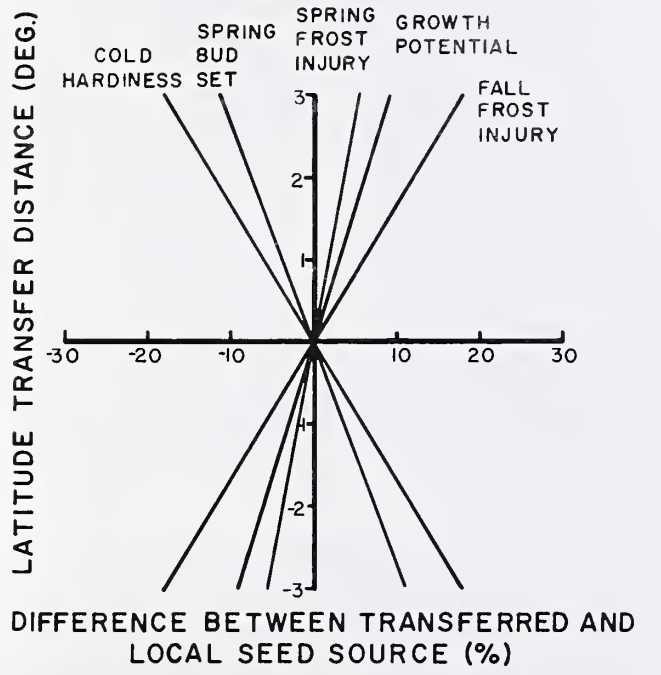


Figure 2.—Percentage differences expected between indigenous seed sources and sources transferred various distances in latitude for several characters.

REFERENCES

Rehfeldt, G. E.
1974. Local differentiation of populations of Rocky Mountain Douglas-fir. Can. J. For. Res. 4:399-406.

Rehfeldt, G. E.
1978. The genetic structure of a population of Douglas-fir *(Pseudotsuga menziesii* var. *glauca)* as reflected by its wind-pollinated progenies. Silvae Genetica 27:48-84.

Rehfeldt, G. E.
1978. Adaptive differentiation of Douglas-fir populations from the Northern Rocky Mountains. Ecology 59:1264-1270.

Rehfeldt, G. E.
1979. Patterns of first-year growth in populations of Douglas-fir *(Pseudotsuga menziesii* var. *glauca).* USDA For. Serv. Res. Note INT-255, 7 p. Intermt. For. and Range Exp. Stn., Ogden, Utah.

Rehfeldt, G. E.
1979. Variation in cold hardiness among populations of *Pseudotsuga menziesii* var. *glauca.* USDA For. Serv. Res. Pap. INT-233, 11 p. Intermt. For. and Range Exp. Stn., Ogden, Utah.

Rehfeldt, G. E.
1979. Ecological adaptations in Douglas-fir *(Pseudotsuga menziesii* var. *glauca)* populations. I. North Idaho and northeast Washington. Heredity 43:383-397.

Intermountain Forest and
Range Experiment Station
U.S. Department of Agriculture,
Forest Service
Ogden, Utah 84401

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